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# Philippines

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NATIONAL INTELLIGENCE SURVEY

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36

Transportation and  
Telecommunications

## NATIONAL INTELLIGENCE SURVEY PUBLICATIONS

The basic unit of the NIS is the *General Survey*, which is now published in a bound-by-chapter format so that topics of greater perishability can be updated on an individual basis. These chapters—Country Profile, The Society, Government and Politics, The Economy, Military Geography, Transportation and Telecommunications, Armed Forces, Science, and Intelligence and Security, provide the primary NIS coverage. Some chapters, particularly Science and Intelligence and Security, that are not pertinent to all countries, are produced selectively. For small countries requiring only minimal NIS treatment, the *General Survey* coverage may be bound into one volume.

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# Philippines

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*This chapter supersedes the transportation and telecommunication coverage in the General Survey dated October 1968.*

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# Transportation and Telecommunications

## A. Appraisal of systems (C)

The insular nature of the Philippines and the location of its large population and commercial centers on or near the coasts have resulted in the development of a transportation system that is largely maritime. Manila is the center of the country's oceangoing and interisland shipping industry and the focal point of the telecommunication (telecom) network. In addition, Manila is the hub of the railroad and highway systems on Luzon (Figure 13, the Terrain and Transportation Map at the end of the chapter).

Only the more important islands have modern transportation media. Railroads operate on two islands, Luzon and Panay, and good roads are found on about a dozen of the large islands. Highways provide the most important means of overland transport; they generally extend along the coasts of the islands and are joined at ports by roads from inland centers. Most rural areas are served only by earth roads which are impassable during the rainy season. A large amount of freight is moved by highway transport; principal commodities moved are textiles, machinery, petroleum products, lumber, and agricultural products. The railroads carry both freight and passengers and, although in critical condition, are of economic importance, especially in transporting sugar and sugarcane. The inland waterway systems are sparse and generally are significant for transporting agricultural products in areas not served by rail or highway. Petroleum pipelines are of minor importance; three pipelines on Luzon, totaling 158 miles in length, are of local significance for the transport of fuel oils and gasoline.

Philippine-flag merchant ships transport all of the country's interisland shipping trade, about 15% of the

nation's exports, and 10% of the seaborne imports. Because of the isolation of the economic centers of the various islands, internal air transportation is most significant. All of the major cities are served by civil air. In addition, a Philippine carrier provides service to 13 foreign cities, and 17 foreign airlines from 16 countries provide scheduled services to the Philippines. Telecom facilities are concentrated on the larger islands, particularly Luzon. Manila is linked to most world centers by high-frequency international radio circuits, supplemented by a communications satellite ground station providing circuits to 14 countries via the Pacific Ocean and Indian Ocean satellites, and submarine cable connections are made with the United States and the Far East. Despite substantial improvement in interisland and international communications, the distribution of reliable domestic facilities is highly uneven and the system is lacking in density and variety. However, projects are underway to increase effectiveness of the system.

Most of the transportation systems and telecom facilities are owned or controlled by various government agencies. The most important development planned or underway is the Trans-Philippine Highway—also called the Philippine-Japan Friendship Highway because of Japanese financial aid—a route that is to extend from the northern coast of Luzon to the southwestern part of Mindanao. The project, totaling 874 miles of road, is expected to be completed in 1976.

## B. Strategic mobility (C)

Railroads in the Philippines are inadequate and their capability to support military operations is minimal. Railroad locomotives and rolling stock are

obsolete and much of the track structure is in serious condition. As of the end of 1972 most of the line north of Manila was out of operation because of flood damage. In sustained military operations, movement and supply of forces would be seriously hampered by poor road surfaces, numerous bottlenecks, and a rainy season which annually floods the roads and inflicts severe damage. However, the ports, merchant marine, and airfields would provide valuable supplements to the land network.

Three of the 11 major ports are naval bases and most others would be able to provide berthing, repair, and logistic support for naval ships. The country's interisland economy has promoted development of many excellent ports throughout the archipelago, providing easy access to most coastal areas of the country. Logistic support inland, however, would be limited by the lack of an extensive inland waterway network. Total military cargo capacity for individual ports is tabulated in Figure 10.

Of the oceangoing merchant fleet, at least 161 ships of 1,049,999 d.w.t. have military-support potential. The 99 dry cargo ships have an extensive potential for short-haul (up to 48 hours steaming) nearseas operations. These ships have a military lift and supply transport potential of 544,663 cargo deadweight tons; their self-loading and unloading capability is enhanced by five units having heavy-lift booms (40 tons or more), 16 having large hatches (more than 50 feet in length), and five with both heavy-lift booms and large hatches. With expansion of the normal passenger capacity of 5,603, the nine passenger, seven combination passenger-cargo, and one combination passenger-refrigerator ship would have a considerable potential for longer haul (more than 48 hours steaming) troop transport. The 30 tankers, including the naval tanker sometimes used commercially, with an estimated capacity of about 2 million barrels (U.S.) of petroleum and related products, could provide a considerable military-support capability. The Philippines Overseas Shipping Act of 1955 empowers the government to take possession of all ships of Philippine registry for use in military-support operations; however, many of these ships may not be readily available in time of national emergency.

All civil aviation resources are under the control of the military. In the event of a national emergency, the military command could suspend all or part of the civil air services to enhance military airlift and reconnaissance capability. Of the 273 usable airfields, eight are military, three are joint military/civil, and 262 are under civil control.

The telecom system is inadequate for military purposes. However, U.S. projects, particularly those designed to ensure communications during disaster or civil insurrection, will increase communications effectiveness. The military operates its own systems, including radio-relay facilities and high-frequency radio systems.

### C. Railroads (C)

Railroads in the Philippine Islands consist of two government-owned common-carrier systems, the Philippine National Railways (PNR) and the Philippine Railway Company (Philrayco). Management, control, and operation of the PNR were taken over by the Secretary, Department of National Defense, pursuant to the declaration of martial law in September 1972. Philrayco is government owned through the Development Bank of the Philippines. The two systems have a total of 727 route miles of 3'6"-gauge track. This trackage is restricted to two islands, Luzon, the largest of the Philippines, and Panay, the sixth largest; none of the trackage is electrified. In addition there are 19 industrial lines of four different gages totaling 1,450 miles; most are short lines, usually of very narrow gage.

PNR, formerly the Manila Railroad Company (MRR), operates only on Luzon. Route length is 654 miles, all single track except 8.5 miles of double track on the outskirts of Manila, from which trunk lines extend northward to San Fernando and southeastward to the port of Legazpi. Before World War II the Manila Railroad Company was the country's most important mode of transportation. The war hit MRR hard, and it has not recovered. The system lost 75% of its rolling stock and much of its track. The railroad is useful for transporting sugar and sugarcane but lacks both freight and passenger capacity (Figure 1). It is inadequate for the limited area served and its capability to support military operations is minimal. The PNR is more important for passenger traffic (65% of operating revenue) than for freight, whereas Philrayco is more important for freight (60% of revenues).

On Panay, Philrayco has a 72-mile single-track line between the coastal cities of Roxas and Iloilo. It is in better shape than PNR but has undergone little change in the last 20 years. A Philrayco line on Cebu has been inoperable since World War II.

The PNR is in critical condition. It is burdened with obsolete locomotives and rolling stock, deteriorated track, and unskilled manpower. The company has been unable to generate the necessary revenue to



rehabilitate the inadequate equipment, perform proper maintenance, or renovate track, structures, and the obsolete communications system. The poor state of the track is one of the most urgent problems. It has kept trains to almost walking pace in some places, and has led to several derailments. On the line south of Manila trains average 22 miles per hour. The flood in 1972 washed out five bridges and damaged two others; the line north of Manila was operable only as far as Malolos at mile 21. On the remainder of the 165-mile northern line, eight long sections of track were under water and mud, and service had not yet been restored by the end of 1972 (Figure 2); current information on the progress of rehabilitation is not available. Damage to the railroad was estimated at US\$2 million. Even before the flood, at least 66% of the PNR track needed ballast and 550,000 ties needed to be replaced. More than 186 miles of PNR track had been laid with 75-pound-per-yard rails, but these have suffered serious damage because the ballast and railbed were designed to support 45-pound-per-yard rails. In the system's major yards, rolling stock and locomotives have been left to deteriorate, mainly because of a shortage of spare parts. In recent years schedules have not been met. PNR management has not known from day to day what locomotives, coaches, or freight stock would be available. Another problem is the unabated pilferage of copper wire from communications and power lines. Pilferage has reached such alarming proportions that the company can no longer replace the copper wire as fast as it is stolen.

Despite 20 years of financial and physical neglect of the PNR, projects for major extensions have not been abandoned. One extension of a branch line, the 16-mile section between Capan and Cabanatuan, was completed in 1969. Some work was done in the 1960's on the 205-mile extension running northward from San Jose through the Cagayan Valley to Tuguegarao, and on the 42-mile Sorogon extension branching off the main line near Legazpi. However, financial difficulties have caused indefinite postponement of further construction. Government officials are presently considering a "turnkey" concept to implement construction. Under this concept, completion of a railroad extension would be handled and financed by private interests. After completion of the line the government would reimburse construction costs. Completion of these new extensions will be accomplished in short sections.

After years of problems a new start has been made toward modernizing the PNR. Rehabilitation of the moribund system has been made possible through a

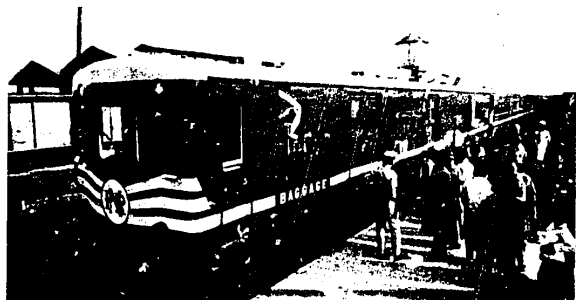


FIGURE 1. Rolling stock of the Philippine National Railways in the yard at Naga (C)



FIGURE 2. Damage done by the July 1972 flood to the Philippine National Railways main line tracks, north of Manila (U/OU)

government act passed in August 1971. The main features of the act are a 4-year rehabilitation program at an estimated cost equivalent to US\$31 million, and provisions for a total outlay of as much as \$72 million to stabilize the financial structure and liquidate outstanding debts.

The first step in the rehabilitation program was the acquisition of 17 new diesel railcars through Japanese reparations; these were put into service on the Manila-Legazpi route in July 1972. The program calls for the acquisition of 27 passenger coaches, 200 freight cars, nine locomotives, five refrigerator cars, and five guard vans. The plan also calls for rebuilding 35 locomotives, 76 passenger coaches, and 232 freight cars. With the completion of the program the number of regular trains can be increased from only 24 in 1972 to 60 in 1975. Ballasting operations have been going on since February 1972. About 560,000 cubic yards of ballast will be needed during the next two years. Other allocations provide US\$1 million for spare parts for rolling stock, \$690 thousand for 37 track-miles of 75-pound rails, \$25 thousand for training and inspection, and \$100 thousand to replace communication and signalling equipment, most of which dates back to 1945. The government act covered only modernization of the PNR's existing line and could not take up the old project to extend the line down through the fertile Cagayan Valley.

Philrayco, which uses some old equipment, has succeeded in keeping its facilities in good condition. If financial negotiations now underway with the government are successful, Philrayco is projected to receive US\$13 million for development, expansion, and new rolling stock. The program proposes a 39-mile extension of the line from Cuartero to Kalibo and acquisition of rolling stock and locomotives, for its operation, to include 15 motor trains, 3 locomotives, 120 cane cars, 10 boxcars, and 3 tank cars; rolling stock and locomotives for the existing line, to include 3 diesel locomotives, 100 cane cars, 30 boxcars, and 17 molasses tank cars; replacement of 60-pound rails with 65-pound rails, and replacement of ties on 20 miles of track; and improvement of passenger service by acquisition of 6 diesel railcars and 12 trailer cars. Completion of the work could take up to 5 years.

Both PNR and Philrayco use flat-bottom rails spiked directly to the ties except on curves, where tie plates are used. All rail is imported, mainly from the United States and Japan. Weight of rail is 65 and 75 pounds per yard on the PNR, and 60 and 65 pounds on Philrayco; rail lengths are 30 and 33 feet. Wooden ties of native hardwood are used, and ballast is crushed stone, gravel, or volcanic ash. Axle loads of 15 short

tons are permitted. Grades are generally light. However, there is a maximum grade of 2.6% on Luzon between Camalig and Daraga on which helper locomotives are used for heavy trains, and on Panay there is a maximum grade of 1.5% between Dumarao and Summit.

The 628 bridges 12 feet or longer on the two systems total 62,850 feet in length. About 10% are temporary timber structures. Most of the principal bridges are of steel-truss or plate-girder construction. The longest PNR bridge, 0.5 mile south of Bauang, is 1,896 feet long; the longest on Philrayco, 0.6 mile northwest of Dao, is 1,265 feet long. There are no tunnels or train ferries.

On single-track lines train movements are controlled by staff systems; communications are by station-to-station telegraph or telephone. Manually operated semaphore signals are used on the 8.5 miles of double-track line in the Manila terminal area.

Virtually all diesel oil for locomotives is imported, principally from the United States, Iran, or Indonesia. The water supply is ample, and treatment is not required.

The PNR has had an unfavorable operating ratio showing an average annual loss of US\$1 million since 1963. Income in FY70 was \$6,224,600 and expenditures were \$6,829,310; 472,000 short tons of freight and 6 million passengers were carried; and 52 million ton miles and 493 million passenger miles were logged. Principal commodities carried are sugarcane, lumber, cement, flour, and sugar. Philrayco has been operating consistently at a modest profit. Earnings in 1972 increased substantially, mainly as a result of lower spending on materials and supplies. Each month the system carries 260,000 passengers, 12,000 tons of sugarcane, 12,000 tons of sugar, and 480 tons of molasses.

The equipment inventory of the PNR consists of one steam locomotive, 73 diesel-electric locomotives, 3 diesel-hydraulic locomotives, 87 diesel railcars, 178 passenger coaches, 64 baggage, mail, and caboose cars, 1,729 freight cars, and 86 service cars. The equipment inventory of Philrayco consists of 6 diesel-electric locomotives, 15 passenger cars, 241 freight cars, 6 miscellaneous service rail vehicles, 11 rail motorears, and 13 railcar trailers. All PNR repairs are handled in Caloocan, where a new train repair shop was installed in 1972; Philrayco repairs are made at La Paz, on Panay.

During FY70 the PNR had 7,619 employees and Philrayco had about 600. The first in-service training for locomotive engineers started recently under a joint program between the PNR and Indian Railways. Ten

technicians were sent to India for special training and others were sent to Japan for training with Japan National Railways. A school was also started with 14 trainees to receive instruction in the operation of locomotives, trouble-shooting, and maintenance.

#### D. Highways (C)

The Philippine Islands have an extensive road network, but most of the roads and bridges are in poor repair and can handle safely and efficiently only a fraction of the fast-growing passenger and freight traffic. Less than 20% of the total road network and 37% of the national highways (primary routes) are paved. However, the highways are by far the most important mode of land transport as the development of railroads has been limited owing to the multiplicity of islands.

The highway network totals 45,690 miles, of which 2,084 miles are concrete, 2,324 miles bituminous, 4,478 miles bituminous-surface treatment, 23,770 miles gravel or crushed stone, and 13,034 miles earth roads.

The road network on Luzon is the most highly developed. The greatest concentration on Luzon is in the vicinity of Manila. However, the city does not have adequate long-distance connections to the northern and southern parts of the island. Nearly all the islands of the Visayan group are circumscribed by first-class roads, but routes into the interior are not well developed. On Mindanao, the second largest island with vast untapped agro-industrial potential, the highway network is sparse and in poor condition. As a result, farm production is restrained by high cost of transport to the markets, and new industries are similarly affected.

The road networks are unevenly distributed; most of the surfaced roads are located in or near cities. The rural areas are served by earth roads whose condition hampers agricultural development of these areas beyond a subsistence level (Figure 3). Most are impassable during the rainy season, and even in good weather are motorable only by vehicles with four-wheel drive. The gravel/macadam roads are also in poor condition. Unless they are of high quality construction and graded regularly, they cannot be classed as all-season roads. The overall road density is 0.39 mile of road per square mile. By comparison, the highway density of neighboring countries is as follows: Japan, 4.5:1; Taiwan, 0.75:1; Malaysia, 0.106:1; Indonesia, 0.078:1; South Vietnam, 0.19:1.

Administratively, the roads are classified as national (12,469 miles), provincial (17,323 miles), municipal

(11,670 miles), and city (4,228 miles). Most of the network is in poor condition, and surface widths vary considerably. On the main highways widths generally range from 10 to 30 feet; most are about 20 feet (Figure 4). On other roads the surface widths range from 8 to 16 feet. Bituminous surfaces range in thickness from 1 to 10 inches; concrete is generally 9 inches. Road bases are usually of stone or gravel and are from 3 to 10 inches thick. Shoulders are of gravel, sand, or earth and are from 1 to 12 feet wide.

Primary route alignments are good in the flat areas but winding alignments with steep grades and sharp curves are common in the mountainous areas of northern Luzon and central and southern Mindanao.

The highway network has 11,866 bridges with a total length of 155.66 miles. Of these, 6,608 are timber structures, many of which are temporary and in need of repair or replacement; 3,288 are concrete or masonry; and the remaining 1,970 are steel, including 1,572 of the Bailey type. Most of the shorter permanent bridges are of concrete-slab or concrete-beam construction. Steel is used primarily for long-span bridges, chiefly those that carry heavy urban traffic. Widths are generally narrow (one lane); vertical clearances range from 8.5 to 20 feet, but most are less than 15 feet. In addition, there are about 170 ferries and fords; on the main routes ferries can transport trucks and buses.

The Bureau of Public Highways (BPH) is responsible for the maintenance of the 12,469 miles of national roads and for new construction and improvements, whether by contract or by force account; preparation of plans and estimates of costs; letting of contracts; and supervision over the construction, improvement, maintenance, and repair of provincial and municipal roads. When first organized in 1954, the bureau had only 6 specialized divisions and 6 field engineering divisions with 54 districts (1 for each province) and 27 cities to administer. By the time of the declaration of martial law in September 1972, the BPH had increased its organizational units to 16 central office divisions, 10 field engineering divisions, 112 districts, and 60 cities—despite the fact that road mileage had not increased proportionately. At this time, it was reorganized and placed under the control of the new Department of Public Works, Transportation, and Communications. As a result of combining related functions, the BPH was reduced to 7 divisions, now has 11 regional offices in geographic areas established in common to all government departments and agencies, and has district offices only in places as may be necessary to undertake actual field operations.



FIGURE 3. Earth road in the countryside near Davao (U/OH)



FIGURE 4. Main north-south highway on Luzon, 30 miles north of Manila. The surface is concrete. (U/OU)

Construction and maintenance problems have resulted from poor administrative practices and diversion of highway funds to other purposes, as well as certain geographic factors. Consequently, about 60% of provincial roads and bridges have deteriorated and continue to be neglected. Physical problems are encountered in the nature of the topography and the effects of climate. Roads in the lowlands become inundated because of monsoon rains and poor drainage. Many pavement surfaces become cracked or broken; gravel and earth roads, rutted or corrugated. Also, parts of the network in the mountainous sections of the major islands have frequent landslides and washouts during the rainy season (Figure 5).

Road construction materials such as cement, gravel, and timber are available locally, but steel bridging materials are imported from the United States and Japan. Fifteen cement plants in geographically dispersed locations produced 2,784,125 tons in 1971. Additional plants to meet projected annual demands are being planned.

The Equipment Division of BPH has control of all construction equipment. The 1970-71 equipment list contained 12,669 units, including 491 motor graders,

104 loaders, 448 rollers, 346 bulldozers, 12 piledrivers, 7 asphalt plants, 10 asphalt finishers, 16 concrete batching plants, 27 rock crushers, and 1,768 trucks. Most of the equipment has been imported from the United States and Japan, and all is less than five years old or has less than 10,000 hours of service.

The Philippine Transport Survey of 1969 provides a master plan for primary highway trunklines as part of the integrated transport system for the country. The highway program in the government's current plan (1970-74) is based primarily on the recommended master plan.

The planned targets include the development and improvement of 6,200 miles of primary and secondary roads and construction of permanent bridges totaling 59,000 feet. Specifically mentioned in the program as priority roads are: 1) important segments of the Trans-Philippine Highway; 2) highways around metropolitan Manila and in the southwestern Luzon region; 3) portions of highways in midwestern Luzon, along or approaching the western coastline, and 4) major trunk roads connecting the urban centers and traversing rich agricultural lands in Mindanao, Cebu, Panay, and Negros islands. For the financing of these

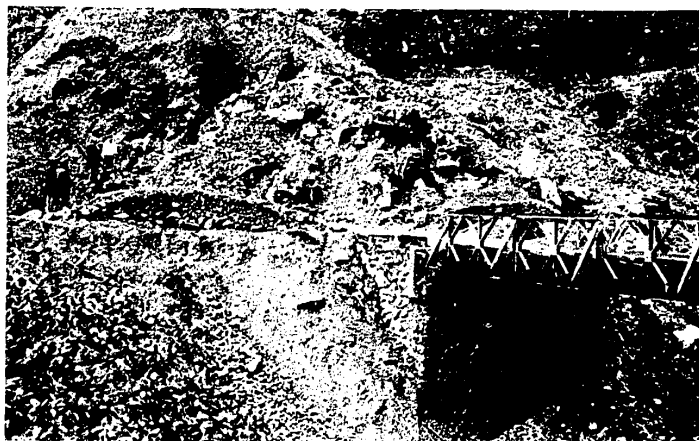


FIGURE 5. National highway route in the interior of northern Luzon, with one-lane earth and gravel surface. The area is subject to landslides. (U/OU)

investments, the plan calls for greater mobilization of domestic resources and envisages a considerable amount of foreign aid, including loans from the Asian Development Bank (ADB), the International Bank for Reconstruction and Development (IBRD), and Japan.

The most important project underway is the Trans-Philippine Highway which was started in 1970 and will serve practically all of Luzon, Mindanao, and the Visayan Islands. Progress so far has been satisfactory, with completion expected in 1976. Construction is in progress on the road section between Legazpi and Sorsogon and on seven major bridges. New contracts were to have been awarded in 1972 for 168 miles of road and 32 bridges. Eventually a total of 874 miles of road, 22 feet in width, will be constructed with concrete or bituminous surface. The largest bridge in this project, the 2,740-foot-long San Juanico bridge between Leyte and Samar, was opened in July 1973. Another large bridge under construction is a 16-span structure 2,821 feet long over the Mactan Channel between Cebu and Mactan Island.

Bids were taken in late 1971 for construction of the Cotabato-Buayan road, financed by a loan from the ADB. Construction is expected to be completed in 1974. The project consists of 133 miles of concrete surface 22 feet wide. Also to be completed by mid-1974 is the construction of a 100-mile all-season road from Cotabato to Digos, the only east-west overland link in central Mindanao.

Other projects are in the planning stage. The Roxas Boulevard, a 6-lane road on the waterfront of Manila, would be extended southward eight miles to the coastal city of Cavite. The last 4 miles would be four-lanes. In February 1972 the World Bank commissioned an engineering firm to prepare a feasibility

study for a concrete-surfaced road from Iligan to Butuan. This is a coastal road in northern Mindanao connecting two of the principal commercial centers, Iligan and Cagayan de Oro, with the Trans-Philippine Highway at Butuan.

Another program sponsored by IBRD involves improvement of the highway around the eastern half of Laguna Bay from Antipolo to Calamba. The estimated cost is equivalent to US\$8.3 million, with \$3.5 million provided by the World Bank. Completion is programmed for 1977. A contract for engineering design of the 93 miles of highway and 39 bridges was awarded in August 1972.

Highway traffic is impeded by the same physical factors that affect construction and maintenance and also by the lack of adequate road markers. Heavy rainfall causes severe floods which damage roads, bridges, and culverts and wash away loose surface materials. During the dry season the motorist encounters potholes and crevices caused during the rainy season, and dust which severely limits visibility. Loose stones from the earth and gravel surfaces are further loosened and thrown about. Vehicle drivers add to the problem as they pass in clouds of dust; in turn, the drivers ahead increase speed, resulting in a reckless contest on winding roads with blind curves and one-lane bridges—in many places on sidehill locations overlooking canyons. Heavy traffic, overloading, and various forms of traffic violations often hinder the free movement of vehicles.

Road transport operations are by private carriers. Traffic rules, including regulation of maximum weights and dimensions of vehicles, vehicle registration, and driver licensing, are the responsibility of the Land Transportation Division within the

Department of Public Works, Transportation, and Communications. Commercial vehicles, buses, jeepneys, and taxis are operated by a number of small independent operators. Each is licensed to operate a number of units along specific routes, on scheduled trips, and at authorized rates for passengers and cargoes. The regulation of rates applies to only 10% of the cargo truck fleet, as the major part of road haulage is done by industrial and commercial firms operating privately.

There are about 260 buslines, 60 trucking companies, and 100 taxicab companies. La Mallorca-Pambusco operates the biggest transport network on Luzon. Other major carriers are the giant Pangasinan Transportation Company (Pantranco), which was recently sold for the equivalent of US\$4.3 million, and Victory Lines, Inc., which has 400 buses in regular service between Manila and the provinces of Zambales and Nueva Ecija. The highway transportation industry employs about 180,000 people. Service is generally below the standards required for safe and efficient operations. Principal goods moved by highway transport are textiles, machinery, petroleum products, lumber, and agricultural products.

In 1971 about 480,000 motor vehicles were registered in the Philippines—300,000 passenger cars and 180,000 trucks and buses. All vehicles for the private-sector market are imported unassembled for local assembly by Filipino assembly plants and the U.S. Chrysler and Ford companies. Only about 25% of the parts are manufactured locally. Auxiliary industries produce tires, batteries, upholstery materials, paints, glues, and glass. In 1970 the industry produced 7,375 cars and 8,824 commercial vehicles, for a total of 16,199 units. Transport equipment ranks second among the principal imports of the country. All the major American makes, as well as many well known British, West German, and Japanese cars, are represented.

In order to complete a shift from auto assembly to actual manufacturing with maximum local resources, the government is advancing a progressive automobile manufacturing program. Under this program five major foreign car manufacturers were approved to build manufacturing plants. The five selected are General Motors-Yutivo-Francisco, Chrysler Philippines, Delta Motor Corporation, DMG, and Ford Philippines. Initial production will be about 16,000 vehicles per year, for which each of the selected manufacturers will be allotted equal quotas. The unsuccessful firms, Renault and Universal Motors who had assembly operations in the Philippines, will be required to phase out their current operations within the next year.

## E. Inland waterways (C)

Inland waterways play a minor role in Philippine transportation, but they are important in some areas where land transportation is difficult. More than 150 rivers and streams that have some degree of navigability provide over 2,000 miles of navigable waterways, and 39 of the principal rivers account for more than 50% of the mileage. Several rivers in the Manila area bear a considerable volume of traffic.

Significant inland waterways are located on Luzon, Samar, and Mindanao. On Luzon, the Pasig, serving the Manila area, can be ascended 1 mile by small ships and 18 miles by vessels drawing 5 and 6 feet. The Pampanga is navigable for 25 miles by launches and 45 miles by small native craft. The Agno is navigable by launches in its lower section, and small craft can ascend 60 miles. Small seagoing vessels can use the Cagayan for 13 miles, and smaller craft can use the stream for 150 miles. The Bicol can be navigated for 25 miles by vessels drawing 9 feet and for 30 miles by small craft. On Samar, the Catubig is navigable for 20 miles by small craft. On Mindanao, the Mindanao is navigable by small steamers for 40 miles and by craft drawing up to 3.5 feet for 70 miles. The Agusan is navigable by craft of 6-foot draft for 20 miles and by small craft for 160 miles.

Inland waterway traffic consists mainly of small craft, motorboats, and small steamers transporting agricultural products from the interior to downstream commercial centers and to the coast. Small craft are ordinarily propelled by sail or by poling, but outboard motors are being used increasingly.

Principal obstacles are shifting sandbars at river mouths, restricted channels during low-water periods, floods, floating debris, and in the upper sections, rock outcrops and rapids. Fixed bridges spanning waterways in the Manila area are the chief restrictions to through movement, particularly during high-water periods when underbridge vertical clearances are considerably reduced.

Control of inland waterways and ports is vested in the Bureau of Public Works of the Department of Public Works, Transportation, and Communications, but little actual control is exercised and little maintenance is undertaken by the bureau. Principal maintenance efforts consist of dredging the Pasig River, channel clearing, and removing floating debris from waterways by provincial or municipal governments.

## F. Pipelines (C)

Pipelines are of minor importance in the distribution of petroleum and natural gas; the primary

means of transportation are coastal tankers, barges, tank trucks, and railroad tank cars.

Three refined products pipelines on Luzon, totaling 158 miles in length, are of local significance. The longest is a 60-mile, 14-inch-diameter line extending from the Shell refinery at Tabangao and the Caltex refinery at Bauan to the terminal in the Pandacan section of Manila. Its capacity is rated at over 2,000 barrels per hour, and it is reportedly used to transport JP-1, JP-4, mogas, kerosene, and diesel fuels.

A 16-inch pipeline connects the Caltex refinery at Bauan to the Manila electric power plant at Muntinlupa. From here the line converts to 10-inch-diameter pipe and continues to the Pandacan terminal in Manila. The 55-mile-long pipeline has a capacity of 2,000 barrels per day and supplies fuel to the power plant and bunker fuel to Pandacan.

A 43-mile-long pipeline connects Subic Bay Naval Base and Clark Air Base. It is a 10-inch-diameter line with a capacity of over 1,000 barrels per day, used to transport aviation fuels.

### G. Ports (C)

The country is dependent almost entirely upon shipping and seaports for interisland and international transportation and commerce. The nation is an archipelago of about 7,100 islands with a total area of about 116,000 square miles, and only 462 have an area of 1 square mile or over. Eleven of the islands (Luzon, Mindanao, Samar, Negros, Palawan, Panay, Mindoro, Leyte, Cebu, Bohol, and Masbate) have areas exceeding 1,000 square miles. The islands' maritime economy is adequately served by 11 major and about 100 minor ports. Five of the major ports are on Luzon, the other six major ports and the 100 minor ports are scattered throughout the islands.

The ports treated in this study were selected on the basis of the relative importance of each port in the national economy, the overall condition and development of the port and its facilities, the volume of cargo and shipping moving through the port, the alongside berthing accommodations, the estimated military unloading capacity, clearance facilities, and the proximity of the port to industrial areas and population centers.

Manila, the principal port (Figure 6), provides the best harbor facilities in the archipelago; it is the center of oceangoing and interisland shipping as well as the focal point of the rail and road systems of Luzon. The ports of Cebu (Figure 7), Davao, Iloilo (Figure 8), Pulpandan, San Fernando, Tacloban, and Zamboanga have relatively small cargo-handling

capacities, and their terminal facilities are limited. Some have no deepwater berthing facilities but all have natural harbors. Three ports, Cavite, Sangay Point, and Subic Bay (Figure 9), are almost exclusively naval. The minor ports, with few exceptions, have meager facilities and small cargo-handling capacities.

Governmental control of the administration and operation of major and many of the minor (excluding naval bases) ports is exercised through the Bureau of Customs, Manila. Some of the minor ports are administered by customs collectors at the separate ports under the Deputy Commissioner, and others are administered and operated by local municipal councils. Reports indicate that the Bureau of Customs is too heavily preoccupied with the collection of revenue to properly manage and maintain the ports; consequently, the condition of most ports is steadily deteriorating. During the past decade, port development and the acquisition of new equipment, although continuing, has been, with the exception of development at Manila and Cebu, extremely slow.

Ship- and cargo-handling operations are sometimes adversely affected by sea swell from weather conditions related to monsoons so that some unprotected ports and anchorage areas may become untenable at certain times of the year. Typhoons are the most hazardous climatic phenomenon in the area, and some 45 harbors are specifically designated as safe typhoon anchorages where vessels may ride out the severest of storms. These harbors and directions for entering them are described in the U.S. Navy Oceanographic Office Sailing Directions.

In addition to the major and minor ports, the Philippines has about 500 small harbors or landings with few if any berthing facilities and extremely limited capabilities. These insignificant terminals serve small villages, local fishing activities, and as outlets for sparsely inhabited agricultural areas. Details of the 11 major ports are tabulated in Figure 10.

### H. Merchant marine (C)

Merchant shipping is of vital importance to the economic development of the country. Heavy reliance is placed on shipping for essential consumer and vital goods imports, and for carrying export commodities. Philippine-flag merchant ships transport all of the domestic (interisland) trade; however, in 1970 only 10% of the nation's international seaborne imports and 15% of the exports were carried by Philippine-flag ships. Currently about \$270 million is

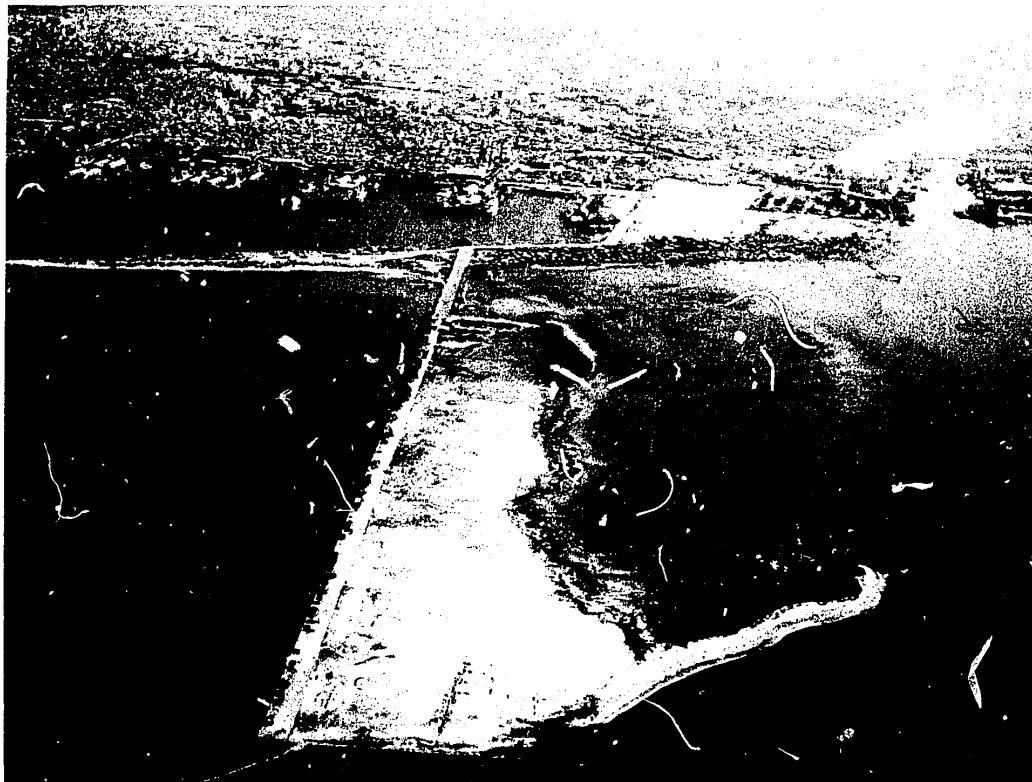


FIGURE 6. The quay which will form the southwest side of new 600-acre international harbor at Manila (C)

spent annually in freight payments to foreign shipping lines for the carriage of its international trade.

In October 1972, the merchant fleet consisted of 170 ships of 1,000 gross register tons (g.r.t.) and over totaling 834,931 g.r.t. or 1,202,539 deadweight tons (d.w.t.) as follows:

| TYPE                                     | No.        | G.R.T.         | D.W.T.           |
|--|------------|----------------|------------------|
| Dry cargo .....                          | 99         | 473,220        | 648,408          |
| Tanker .....                             | 29         | 177,839        | 294,504          |
| Bulk cargo .....                         | 8          | 86,834         | 146,803          |
| Tir rer carrier .....                    | 6          | 23,713         | 37,724           |
| Refrigerator .....                       | 2          | 26,278         | 28,358           |
| Combination passenger-cargo .....        | 7          | 17,787         | 21,826           |
| Passenger .....                          | 9          | 17,898         | 11,867           |
| Combination tanker-ore carrier .....     | 1          | 4,010          | 5,737            |
| Naval tanker* .....                      | 1          | 3,102          | 4,200            |
| Combination passenger-refrigerator ..... | 1          | 4,250          | 3,112            |
| <b>Total .....</b>                       | <b>170</b> | <b>834,931</b> | <b>1,202,539</b> |

\*Sometimes used commercially.

The ships of the fleet are generally old, small, and slow. The 99 dry-cargo ships constitute about 54% of the fleet's d.w.t. and total tanker tonnage amounts to 24% of the fleet's d.w.t. In terms of d.w.t., 32% of the fleet (74 ships) is 20 years old or older; 39% (62 ships) is 10 to 19 years old; and 29% (34 ships) is less than 10 years old. Of the total fleet (170 ships), 137 ships representing 50% of the d.w.t. are less than 10,000 d.w.t.; 30 ships (35% of the d.w.t.) are between 10,000 and 24,999 d.w.t.; and three ships (15% of the d.w.t.) range between 29,000 and 96,200 d.w.t. The largest ship is a 96,191-d.w.t. tanker. A total of 112 ships have service speeds of less than 14 knots, 43 have speeds of 14 through 17 knots, and 15 (12 dry-cargo, one passenger, one refrigerator, one combination passenger-cargo) have speeds of 18 through 21 knots. A total of 161 ships are diesel powered, seven have oil-fired boilers, and two have coal-fired boilers.

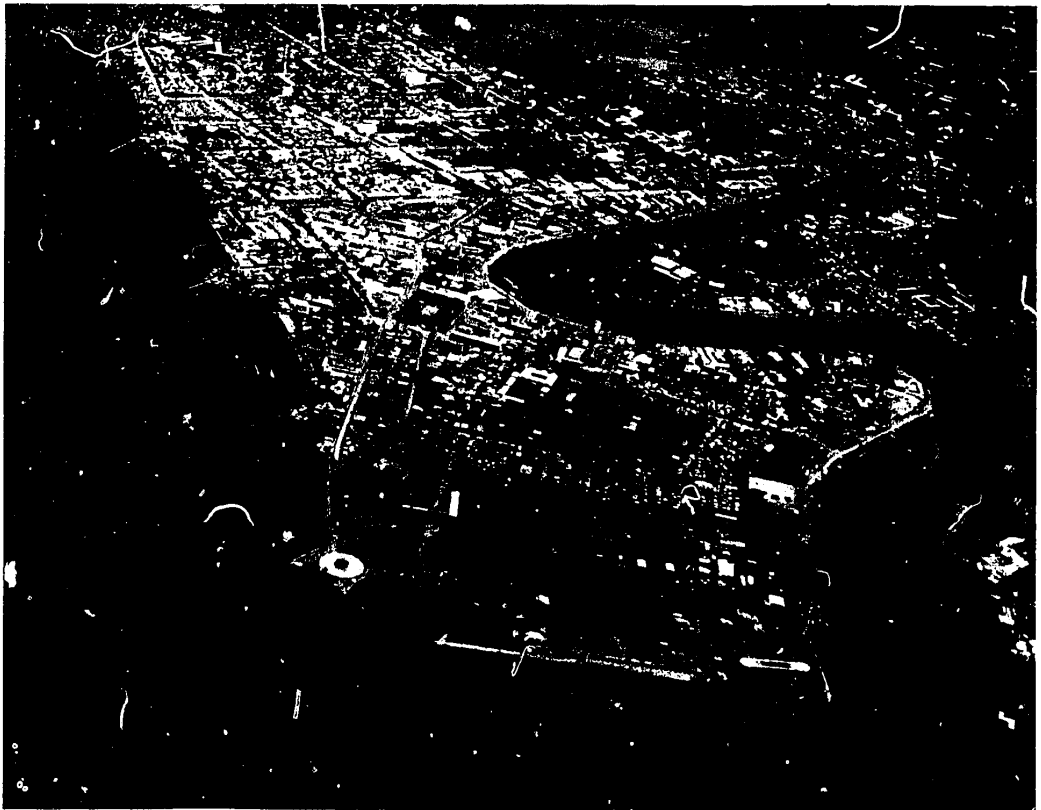
Fleet ownership is divided among 45 government and private domestic beneficial owners (entities which





FIGURE 7. Port facilities and city of Cebu. Shell Oil tank farm is on the island in foreground. (C)

FIGURE 8. Iloilo harbor and river. The wharf in foreground has been extended about 400 feet southwestward. (C)



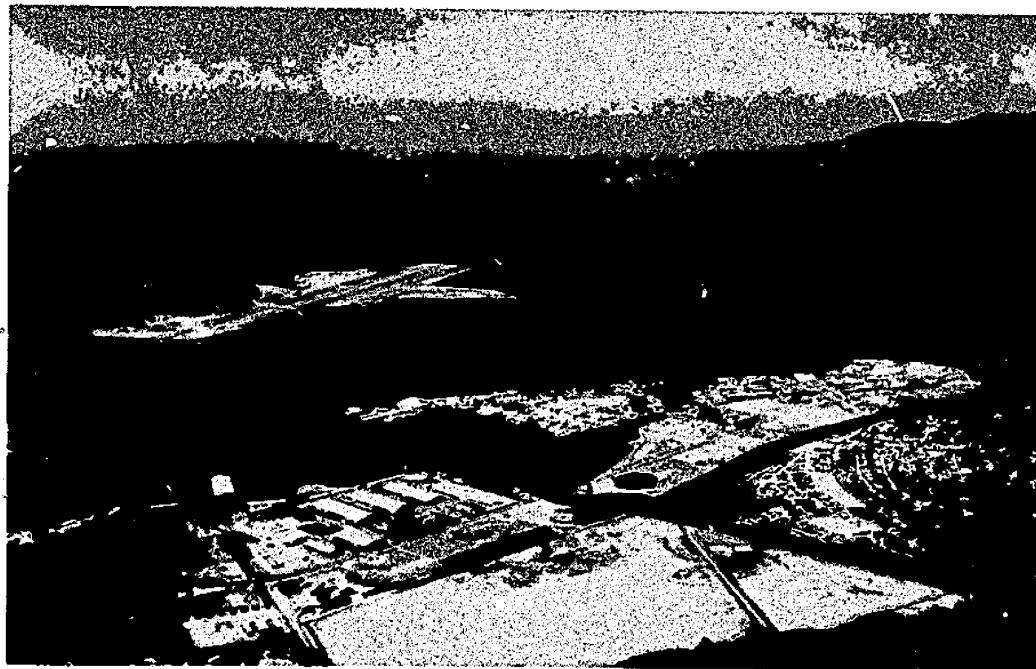


FIGURE 9. Port facilities at Subic Bay. The U.S. Naval Air Station, Cubi Point, is in the background. (C)

take the profit or loss from operations). The four largest owners, who control more than 45% of the total fleet d.w.t., are as follows: United Philippine Lines, Inc. (eight ships, 181,378 d.w.t.); Luzon Stevedoring Corporation (LSCO) (25 ships, 144,242 d.w.t.); *Companta Martima* (19 ships, 137,544 d.w.t.); and the Philippine Government (seven ships, 96,871 d.w.t.). Of the remaining 41 beneficial owners who control 111 ships, about half operate only one ship.

Twelve private beneficial owners of Philippine-flag ships also own a total of 53 ships of 1,000 g.r.t. and over, aggregating 380,453 d.w.t., under foreign flag, including 35 ships of 253,748 d.w.t. registered in Liberia and 18 of 126,705 d.w.t. registered in Panama. In addition, two Philippine nationals own a 128,600-d.w.t. tanker registered in Liberia and two dry-cargo ships totaling 9,333 d.w.t. under Panamanian registry.

There are no known foreign ownership interests in the fleet. By law, national-flag ships must be 75% Filipino owned and completely Filipino controlled.

The majority of the merchant ships employed in international trade operate in scheduled (liner) service and a lesser number participate in nonscheduled (tramp) operations. Philippine shipping companies

maintain shipping services between the Philippines and the United States, Canada, and countries in South America, Western Europe, and the Far East.

Principal exports carried by the fleet are coconut products and sugar; exports of forestry products are mostly carried by foreign ships. Principal imports carried by the fleet are machinery, transportation equipment, textiles, foodgrains, dairy products, and petroleum products.

Philippine shipping companies are members of the following shipping conferences: Philippine-Latin American Rate Agreement; Philippine-Asian Conference; Philippine-Australian-New Zealand Conference; Philippine-European Conference; and the Philippine-North American Conference.

With over 7,000 islands in the Philippine archipelago, domestic shipping is essential to the nation's economy. In addition to the merchant ships of 1,000 g.r.t. and over operating in the domestic trade, there were in 1971 at least 200 merchant ships ranging from 100 to 999 g.r.t. totaling about 102,800 d.w.t. which operated primarily in domestic traffic. There were also over 2,000 small ships ranging from 20 to 95 g.r.t. and a number of World War II converted

FIGURE 10. Major ports (C)

| NAME; LOCATION; ESTIMATED MILITARY PORT CAPACITY*  | ACTIVITIES  | HARBOR  | BERTHS   |
|--|---|---|--|
| Cavite Naval Base.....<br>14°29'N., 120°55'E.; about 6<br>nautical miles SW. of Manila.<br>2,800 | Primary repair and support base for the navy.<br>In addition to its landing and repair facilities, the base has supply, ordnance, communications, and medical components. Five floating drydocks, largest has a lifting capacity of 3,800 long tons. One marine railway, hauling capacity 150 long tons. Facility handles all navy repair work.   | Improved natural; consists of two small shallow sheltered bays separated by small peninsula on which facilities are located. Depths range from 13 to 25 ft.               | Alongside—For 2 frigates, 3 escort vessels (DE), 1 ocean-type and 1 coastal-type minesweepers, and 6 motor torpedo boats.<br>Anchorage—For about 12 standard and numerous small ocean-type cargo vessels about 2½ miles NE. of naval base in sheltered indentation in Manila Bay. Anchorage covers a water area of about 4 square miles and has depths of 25 to 30 feet over good holding ground of mud. Outside this area is extensive anchorage area for ships of all classes in Manila Bay. |
| Cebu.....<br>10°20'N., 123°55'E.; on E.<br>coast of Cebu.<br>12,000                              | Commercial center for central and southern Philippine Islands and second most important port. Receipts—POL, machinery, textiles, flour, cloth, and building materials. Shipments—copra, hemp, and coconut oil. Eight marine railways; largest has a hauling capacity of 3,000 long tons. Four marine railways, largest with 1,500 long-ton hauling capacity, are located at Danao, 16 miles N. of Cebu. | Improved, natural harbor in strait separating Cebu and Mactan Islands. Irregular in shape, harbor extends NE-SW. for about 10 miles with central depths of 28 to 30 feet. | Alongside—For 1 large, 5 standard, and 10 small ocean-type cargo vessels; 5 standard and 3 small coaster-type vessels; 42 lighters; and 2 small ocean-type tankers.<br>Anchorage—Extensive for vessels of all classes about 2 miles SW. of port in depths of 36 to 60 feet over mud bottom.  |
| Davao.....<br>7°04'N., 125°25'E.; on SE.<br>coast of Mindanao<br>2,200                           | Chief commercial center of S. Mindanao. Receipts—flour, agricultural implements, trucks, auto and tractor parts, tires, canned goods, surgical products, packaged POL. Shipments—hemp, logs, copra, crocodile skins also shipped.   | Natural, well-protected harbor within Pakipatan Strait near head of Davao Gulf. General depths in harbor are 7 to over 100 fathoms.                                       | Alongside—For 2 standard and 1 small ocean-type cargo vessels, and 1 standard and 3 small ocean-type tankers.<br>Anchorage—Numerous for vessels of all classes in sheltered harbor area.   |
| Iloilo.....<br>10°42'N., 122°35'E.; on SE.<br>coast of Panay.<br>14,600                          | Important port and distribution center for surrounding area. Receipts—cloth, POL, food, and manufactured goods. Shipments—sugar, copra, abaca fiber, copra meal, manganese ore, and molasses. Four marine railways, largest has a hauling capacity of 1,200 long tons; one graving dock, 250 ft. x 60 ft. x 13 ft.  | Natural, well-sheltered harbor, comprised of sections of Iloilo Strait and Iloilo River. Strait portion of harbor has general depths of 30 feet; river portion, 17 feet.  | Alongside—For 2 standard ocean-type cargo vessels, 1 standard and 32 small coaster-type cargo vessels, 51 lighters, and 1 small ocean-type and 1 coaster-type tankers.<br>Anchorage—Numerous for vessels of all classes in sheltered area of Strait where depths range from 5 to 28 fathoms over good holding ground of mud and sand.  |

Footnote at end of table.

FIGURE 10. Major ports (Continued) (C)

| NAME, LOCATION, ESTIMATED MILITARY PORT CAPACITY*   | ACTIVITIES   | HARBOR  | BERTHS   |
|---|--|---|--|
| Manila.....<br>14°35'N., 120°58'E.; on W. coast of Luzon.<br>45,000                       | The most important port and urban complex in the Philippines, and one of the best ports in the Far East. Manila handles about 85% of the country's imports and is the center of interisland shipping. Most government functions, including the Customs Bureau and Naval Headquarters are located at Manila. Extensive port development is underway to enlarge the international and interisland port facilities. Receipts—grain, tobacco, textile fibers, paper, metals, nonmetallic minerals, POL, general cargo. Shipments—sugar, tobacco, timber, hemp, coconut products, minerals and metals, fruits, and cotton textiles. Seven marine railways; largest has a hauling capacity of 1,500 long tons. One graving dock, with a capacity for ships up to 7,500 g.r.t., is located at Mariveles, 30 miles W. of Manila. | Breakwater protected artificial harbor on the E. side of Manila Bay. Has three major components: North Harbor, South Harbor, and a section of the Pasig River estuary which separates the two harbors. South Harbor is about 1,250 acres in extent and has depths of 12 to 37 feet. It is the only area at Manila where deep-draft vessels can be accommodated. North Harbor is about 1,000 acres in extent with general depths less than 18 feet. The Pasig River section, a little over 1 mile long with an average width of 500 feet, has depths of 14 to 18 feet. | Alongside—For 8 large, 11 standard, and 5 small ocean-type cargo vessels; 8 standard and 48 small coaster-type cargo vessels; 151 lighters.<br>Anchorage—26 breakwater-sheltered berths in South Harbor; berth radius 130 yards with depths ranging from 14 to 32 feet, only 4 of these can accommodate vessels up to 30-foot draft. Extensive area for vessels of all classes in Manila Bay outside breakwaters.<br>Mooring—Several mooring buoys in South Harbor in depths of 15 to 25 feet.           |
| Pulupandan.....<br>10°31'N., 122°48'E.; on N.W. coast of Negros.<br>2,200                 | Principal shipping and commercial center of Negros Island. Receipts—jute, dry goods, hardware. Shipments—sugar, copra.   | Roadstead harbor in Guimaras Strait between Guimaras and Negros islands. Harbor is about 4 miles long and 1/2 to 1 1/2 miles wide. Anchorage and harbor area exposed to northerly winds and the SW. monsoon.<br>Improved natural harbor formed by peninsula extending NW. from coast. Harbor is about 1 1/2 miles in diameter and has central depths of 45 to 120 feet. Harbor area and anchorage exposed to northerly winds.   | Alongside—For 1 standard ocean-type and 2 small coaster-type vessels and 10 lighters.<br>Anchorage—For large numbers of vessels of all classes in Guimaras Strait.   |
| San Fernando.....<br>16°37'N., 120°19'E.; on W. coast of Luzon.<br>3,145                  | An important center for receiving POL and mining equipment, and for shipping ore from the nearby mines. Philippine naval station located in SW. part of harbor has landing, supply, communications, medical, housing, and administrative components. One marine railway with two parallel transverse, each 330 feet long; hauling capacity 650 long tons.  | Alongside—For 3 large and 2 standard ocean-type cargo vessels, 6 lighters, and 1 motor torpedo boat.<br>Anchorage—For 4 large and 10 small ocean-type cargo vessels in harbor over good holding ground of mud. Numerous berths for vessels of all classes outside harbor.   | Alongside—For 3 large and 2 standard ocean-type cargo vessels, 6 lighters, and 1 motor torpedo boat.<br>Anchorage—For 4 large and 10 small ocean-type cargo vessels in harbor over good holding ground of mud. Numerous berths for vessels of all classes outside harbor.  |
| Sangley Point.....<br>14°30'N., 120°55'E.; about 6 nautical miles SW. of Manila.<br>1,800 | Important naval base and military airfield. Was leased to the U.S. after W.W.II under Military Bases Agreement and later returned to Philippine control. The base has ordnance, supply, communications, housing, and medical components. Privately owned repair facility with two marine railways; larger has a hauling capacity of 2,500 long tons.   | Natural, in Canacao Bay; formed between the Sangley Point and Cavite peninsulas. It is a small, natural sheltered harbor somewhat less than 1 square mile in area, having general depths of 13 to 27 feet.  | Alongside—For 2 ocean-type and 4 coastal-type minesweepers, 4 motor torpedo boats, 1 small ocean-type and 1 standard coaster-type vessels, 8 lighters, and 2 tank barges.<br>Anchorage—For 12 ocean-type and numerous smaller cargo vessels in sheltered indentation of Bay NE. of naval station in depths of 20 to 30 feet over mud bottom with good holding quality; extensive for all classes in Manila Bay.<br>Mooring—3 buoys can accommodate a small ocean-type cargo vessel in depths of 2, feet. |

Subic Naval Station, Subic Bay. 14°-9'N., 120°17'E.; on W. coast of Luzon about 45 nautical miles WNW. of Manila. 10,750

Improved, practically landlocked harbor occupying all of Subic Bay N. of Grande Island. Water area is about 24 square miles; depths range from 48 to 180 feet. Harbor has no protective system of breakwaters; however, it is amply protected from weather by its 6-mile penetration of the coast and by the surrounding mountains and high hills. Port Olongapo, with a water area of about 2 square miles, indents the E. side of harbor and provides the only deep-water alongside berths.

Alongside—For 3 large and 4 small ocean-type, and 4 standard and 1 small coaster-type cargo vessels; 4 lighters; 2 large ocean-type tankers; 1 large and 1 small aircraft carriers; 1 cruiser; 2 frigates; 3 destroyers; 1 escort; 12 ocean-type minesweepers; and 1 motor torpedo boat.

Anchorage—The greater part of Subic Bay has extensive designated anchorage areas for all classes of naval and merchant vessels. The majority of the anchorages are in depths ranging from 84 to 168 feet over soft mud or coral bottom.

Mooring—About 14 mooring buoys located in designated anchorage area. Seven of the buoys are located in Port Olongapo, the largest being the POL mooring buoy.

Alongside—For 4 small ocean-type cargo vessels, 2 standard and 1 small coaster-type cargo vessels, 1 lighter, and 1 coaster-type tanker.

Anchorage—For 9 large and 10 small ocean-type cargo vessels in San Juanico Strait E. of port in depths of 30 to 36 feet over a mud bottom.

Area exposed to SE.

Alongside—For 3 small ocean-type and 2 small coaster-type cargo vessels, 15 lighters, 1 coaster-type tanker, and 1 tank barge.

Anchorage—For 2 large and 3 small ocean-type vessels W. of port. Anchorage is not good because of the steep bank, hard uneven bottom, and a 6-knot current. Vessels can anchor anywhere outside the 60-foot depth curve, S. of Zamboanga Wharf. However, many vessels have lost their anchors here.

Mooring—For 1 small ocean-type tanker.

Improved, practically landlocked harbor occupying all of Subic Bay N. of Grande Island. Water area is about 24 square miles; depths range from 48 to 180 feet. Harbor has no protective system of breakwaters; however, it is amply protected from weather by its 6-mile penetration of the coast and by the surrounding mountains and high hills. Port Olongapo, with a water area of about 2 square miles, indents the E. side of harbor and provides the only deep-water alongside berths.

Small, natural harbor at head of San Pedro Bay and within San Juanico Strait. Shelter provided by adjacent terrain. Central depths average 36 feet. Controlling depth in channel is 19½ feet.

Rorstead in Basilan Strait, between Basilan Island and SW. extremity of Mindanao. Harbor limits embrace an area of about 1,200 acres with an average depth of 17 fathoms. A small shallow breakwater-protected inner harbor available for small craft.

Principal industry of area is copra and abaca hemp production. Customs port of entry and distribution center for commodities imported into Leyte. Receipts—fish, corn and rice. Shipments—copra, abaca, and lumber. Port has no significant ship repair facilities.

Principal city of island and center for shipping copra, lumber, and rubber. Area has copra mill, fish cannery, sawmill, and rubber plantations. Naval refueling station located at Baliwasan, about 1½ miles W. of port area. Small radio station; limited stocks of POL. Miscellaneous supplies. One floating drydock, lifting capacity 212 long tons.

Principal city of island and center for shipping copra, lumber, and rubber. Area has copra mill, fish cannery, sawmill, and rubber plantations. Naval refueling station located at Baliwasan, about 1½ miles W. of port area. Small radio station; limited stocks of POL. Miscellaneous supplies. One floating drydock, lifting capacity 212 long tons.

\*The estimated military port capacity is the maximum amount of general cargo—expressed in long tons—that can be unloaded onto the wharves and cleared from the wharf aprons during a period of one 24-hour day (20 effective cargo-working hours). The estimate is based on the static cargo-transfer facilities of the port existing at the time the estimate is prepared and is designed for comparison rather than for operational purposes; it cannot be projected beyond a single day by straight multiplication.

naval auxiliaries, such as landing craft and minesweepers, engaged in providing feeder services to outlying areas in the archipelago.

Extensive domestic shipping services connect Cebu, the island's principal trading center, with all the important island ports. These services are hampered by unprofitable government-regulated freight and passenger tariffs, poor port facilities, inefficient loading and unloading methods, and cutthroat competition in obtaining cargoes. Many of the ships are obsolescent and uneconomical to operate; poorly trained crews and inadequate navigational equipment have resulted in low safety standards, overcrowding, and erratic sailing schedules.

The government supports a viable and progressive fleet development program. To increase the nation's fleet capacity for the carriage of its own foreign trade, the Philippines Overseas Shipping Act of 1955 provided government-financed, low-interest loans to national shipowners for the acquisition of new merchant ships to be used exclusively in international trade. Further impetus to fleet development was given by the Philippines-Japan War Reparations Agreement of 1955 and the Philippines-West Germany Capital Aid Agreement of 1964, which provided financing for the construction in Japan and West Germany of a large number of ships for the merchant fleet. Of the total new ships acquired in 1960 and 1961, 21 ships of 238,000 d.w.t. were built in Japanese shipyards. Between 1962 and 1966, there was an annual net increase of 15 ships totaling about 100,000 d.w.t. Additional fleet expansion continued during the period 1967-70 when the fleet increased from 123 ships of 918,700 d.w.t. to 168 ships of 1,258,300 d.w.t.; annual net increases averaged about 10 ships totaling 84,967 d.w.t. during this period. During 1971 and 1972 seven ships of 30,000 d.w.t. were added to the fleet. In late 1972 the government allocated funds equivalent to US\$120 million and authorized the government-controlled National Development Company (NDC) to acquire from foreign sources a number of new and used ships with an average tonnage of 10,000 d.w.t.; these ships, to be employed in international trade, will be available for purchase by private Philippine shipowners on a low-interest, long-term repayment plan.

Numerous plans have been proposed for large-scale expansion and modernization of the domestic trade fleet. Through the Philippines Coastwise Act of 1956, funds appropriated over a 5-year period were to have been provided for loans to Philippine shipowners on ships built in the government-owned Bataan National Shipyard at Mariveles; however, results of this

program were minimal. Subsequently, the Philippines-West Germany Capital Aid Agreement of 1964 provided for a West German loan equivalent to US\$10 million for the construction of seven ships totaling 29,000 d.w.t. in West German shipyards; these ships were delivered in 1963. Provisions were then made in the Four Year Economic Program (FY67-70) for the construction of about 30 ships by domestic shipyards, but because of insufficient government funds no progress was made. In December 1972 the government announced a 10-year domestic shipbuilding program for the construction of 16 ships for the domestic trade. This program includes a fund of about US\$50 million to be provided by the Development Bank of the Philippines (DBP) for the extension of long-term loans to Philippine shipowners.

As of November 1972 four ships totaling 71,400 d.w.t. for Philippine registry were on order for delivery between 1973 and 1975. Included are two 28,500-d.w.t. bulk carriers to be built in Japanese shipyards, one semicontainer ship of 12,800 d.w.t. to be built in a West German shipyard, and one 1,600-d.w.t. combination passenger-cargo ship to be constructed in a domestic yard.

Of the 64 newly acquired ships in the fleet, only two of 1,300 and 1,500 d.w.t. were built in domestic yards. The Philippines' reliance on foreign shipyards for new ship requirements involves a substantial expenditure of foreign exchange. The only domestic shipyard with a capability of constructing ships of 1,000 g.r.t. and over is the government-owned Bataan National Shipyard which can build ships up to 3,000 g.r.t. A new shipyard on Cebu, being built in collaboration with Japanese interests, will have a shipbuilding capability for the construction of 5,000 g.r.t. ships and repair facilities for ships up to 15,000 g.r.t.

In 1971 the fishing fleet consisted of about 2,500 small craft totaling about 70,800 g.r.t. and included about 2,000 small motorized units. Although most of the fishing fleet operates in Philippine waters, there are 33 oceangoing trawlers ranging between 100 and 3,999 g.r.t. totaling 7,390 g.r.t.

Merchant marine matters are administered by the Department of Commerce and Industry. Government maritime policy as formulated in the Overseas Shipping Act of 1955 has been predicated on a fourfold goal: 1) To encourage and assist Philippine-flag shipping engaged in international trade; 2) to foster the development and maintenance of such a merchant fleet; 3) to provide financial aid in long-range shipbuilding and ship acquisition programs; and 4) to create a climate conducive to private capital investment in international shipping. In domestic

trade, government policy requires the carriage of interisland cargo by Philippine-flag ships.

Although no direct operating subsidies are provided national shipowners, the government indirectly subsidized the shipping industry. Ships acquired under the Overseas Shipping Act and War Reparations Agreement are government owned; however, they have been chartered to private shipping companies with a commitment to purchase under extremely liberal terms. Shipowners are allowed a 10-year tax exemption on income derived from ships engaged in international trade. The Investment Incentives Act of 1967 permits Philippine exporters to deduct from their taxable income double the amount of freight charges for exports carried on ships of Philippine registry. In late 1972 a Cargo Reservation Act was promulgated which decreed that: 1) Philippine-flag ships would be given preference in the carriage of imports; 2) all imports would be made on an f.o.b. basis with all freight payments made in pesos; and 3) foreign shipping agents may remit the pesos earned through the Central Bank of the Philippines to shipowners abroad. Government loans are extended to national shipowners on new ships constructed in foreign shipyards for international trade. These loans cover 50% to 80% of the cost of the ships and are payable over a 10-year period; the required 20% downpayment in foreign exchange is raised by the shipowner. During the current 10-year domestic shipbuilding program, the DBP will finance up to 80% of the cost of new ships being constructed at the Bataan National Shipyard through long-term loans at low interest rates.

There are sufficient numbers of trained officers and seamen to man both domestic- and foreign-flag ships. Because of their affinity for the sea and skill in

seamanship, Filipinos are sought for employment aboard foreign-flag ships. Compared with European standards, Philippine seafaring wages and other compensation are low; however, certain fringe benefits complement the modest wage schedule.

A Philippine merchant marine academy at Manila offers officer candidates a 4-year course consisting of 3 years of classroom work and a year of practical training aboard a U.S. Liberty-type training ship; graduates received Bachelor of Science degrees in marine transportation with majors in navigation and seamanship or in steam-engine and electrical engineering. Merchant marine schools at Manila, Iloilo, and Cebu provide 2-year courses for deck and engineering officers; graduates serve 2 years aboard ship as apprentices prior to taking licensing examinations. Philippine maritime academies graduate more than 700 candidates a year.

### I. Civil air (C)

Civil aviation enjoys a significant position in the transportation system due to the isolation of the more than 7,000 islands that make up the Republic of the Philippines.

There are three scheduled air carriers in the Philippines, which include Philippine Air Lines, Inc. (PAL), Filipinas Orient Airways, Inc. (FOA), and Air Manila, Inc. (AMI). PAL is the flag carrier and the oldest and largest domestic airline in the country. In operation since 1946, it has flown more than 20 million revenue passengers on both its international and domestic routes. On its international routes, PAL's McDonnell Douglas DC-8 jetliners (Figure 11) fly to San Francisco, Honolulu, Sydney, Melbourne, Hong

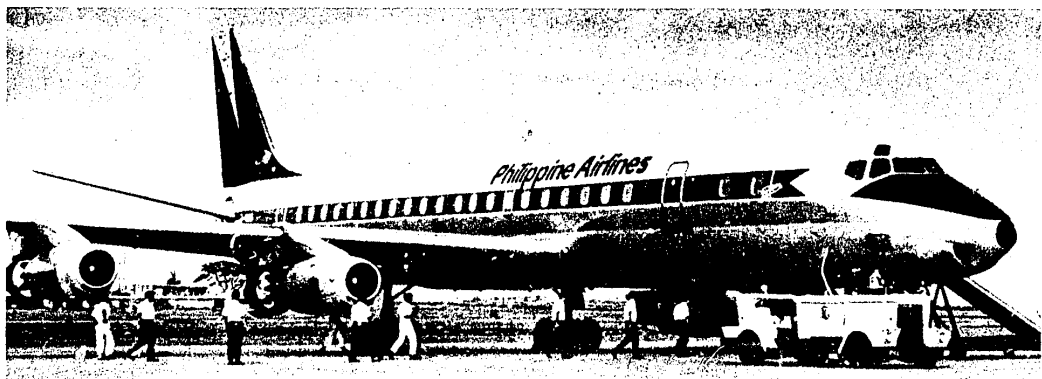


FIGURE 11. A Philippine Airlines DC-8 jetliner used on international routes (U/OU)

Kong, Tokyo, Taipei, Singapore, Bangkok, Karachi, Rome, Frankfurt, and Amsterdam. On its domestic routes, PAL operates BAC Series 500 111 jets and Hawker Siddeley 748 jetprops to more than 30 cities and towns from Manila. Routes range in distance from 27 to 602 miles. Its fleet and services make PAL one of the largest carriers in Southeast Asia. The airline has been a privately controlled corporation since 1965, but for 16 years before that the government had controlled the airline. It still holds 25% of the stock in the company. The PAL airfleet consists of 32 transports as follows: five DC-8, 13 HS-74, three BAC-111, 12 F-27, and 12 DC-3 aircraft. The airline employs 4,620 people, 188 of whom are pilots. Since 1970, the fortunes of PAL have been on the decline because of the floating rate of the peso, the inequitable regulation of domestic competition, the introduction of more foreign airline service into Manila, and a disastrous strike by PAL's pilots. After 20 consecutive years of profit, PAL suffered a loss of 28 million pesos in 1970 and was forced to cut its costs and cancel unprofitable domestic routes, and to stop or defer orders for new aircraft.

Its competitors, FOA and AMI, were temporarily enjoying a much better fate. In 1971 FOA registered a 51.8% increase in gross revenue as compared to its income in 1970, retaining a firm second place among the three domestic commercial airlines in passenger load and gross revenue for the year. During the same year PAL carried nearly a million passengers, as compared to 577,897 carried by FOA, and 311,314 carried by AMI. Since 1964, FOA has operated an extensive network of scheduled passenger services as well as charter flights throughout the country. Their fleet consists of two Boeing 707, four YS-11, three Nord 262, one DC-6B, and seven DC-3 aircraft; employees number about 600.

AMI serves 18 cities and municipalities in the southern Philippines. Airline administrators claim that they have gained a 15% share of all passenger traffic in 1971 which is up sharply from a mere 8% in 1970. AMI has an airfleet which includes two Lockheed Electras, two Handley Page Dart Heralds, nine Fairchild F-27s and eight DC-3 aircraft. The airline employs 689 people, 59 of whom are pilots.

All civil aviation activities were drastically affected by President Marcos' declaration of martial law in 1972. In a follow-up letter of instruction President Marcos directed his Secretary of Defense to take over the management of all three airlines and to seize all privately owned aircraft for the duration of the national emergency. Sweeping government organizational reforms were also initiated which formed a new

Bureau of Transportation, abolished the Civil Aeronautics Board, and merged the Civil Aeronautics Administration and the Land Transportation Commission into the Department of Public Works, Transportation, and Communications. Under this new arrangement civil aviation matters will be regulated by an Air Transportation Division that is subordinate to the Bureau of Transportation. This Air Transportation Division is responsible for undertaking traffic and economic studies for the development of a national airport and airways system; estimating present and future requirements for airport and air navigation facilities; administering air safety programs for airmen, aircraft, and airlines operations, including supervision of aviation schools; licensing of airmen, aircraft, and air routes; and administering the operation of air traffic control and communications facilities.

It has been reported that the government wants to merge the present three airlines into one national airline in the near future. The Secretary of Defense is considering a plan whereby both AMI and FOA would be merged into the existing structure of PAL. PAL would be the surviving airline, with the national government retaining 51% of the stock. Essentially, civil aviation would revert to the pre-1964 arrangement. Some of the reasons given for this merger center on the fact that revenue from airline operations has fallen sharply since the imposition of martial law with its travel restrictions. Government authorities indicate that they believe it economically impractical for three small airlines to compete with 11 different varieties of equipment in a country as small as the Philippines. Authorities also indicate that all foreign management personnel will be phased out of Philippine Airlines positions within the next 3 years.

In addition to the major air operators there are about 12 smaller air companies that perform a host of varied missions, such as air charter, taxi, crop dusting and spraying, and other miscellaneous air services. Pacific Airways Corporation operates 18 light aircraft which fly domestic air transport missions from Manila to the southern islands. Most of these small air companies fly only light aircraft, but one DC-3 aircraft is owned by Universal Air Services, Inc., and another DC-3 by the Faravion Company. Private owners possess 10 more DC-3 aircraft, and one DC-3 is flown by the Department of Public Works, Transportation, and Communications.

The country has no central civil aviation training facility. The three scheduled carriers apparently train their own maintenance personnel. PAL also trains its administrative personnel and pilots, as well as pilots



for other airlines. The school is fully equipped for primary and advanced flight training. DC-8 crews are trained by KLM—Royal Dutch Airlines in Amsterdam. Four schools in the Philippines offer courses in a variety of aviation subjects, including flight instruction and aircraft maintenance engineering. Pilot training programs of a limited nature are provided by 11 flying clubs, and it is likely that the small charter and airwork operators also have training arrangements.

PAL performs ground handling services for almost all foreign airlines calling at Manila, and maintenance services for the Philippine and U.S. armed forces, other carriers, and private aircraft owners. The airline is certified by the U.S. Federal Aviation Administration as a repair agency for U.S.-registered aircraft. The other aviation enterprises perform some of their own maintenance, but their extent and capabilities are unknown.

The government has entered into formal or informal civil aviation agreements with 26 countries, but it does not have any known agreements with any Communist country. A regional breakdown shows that there are agreements or understandings with nine countries in Asia, three in the Middle East, 12 in Europe, and two in North America.

Through the terms of these agreements Manila is served by 17 foreign air carriers: Qantas Airways, KLM—Royal Dutch Airways, Japan Airlines, Air France, Sabena—Belgian World Airlines, Swiss Air, Scandinavian Airlines System, Alitalia, Northwest Orient Airlines, Pan American World Airways, Pakistan International, Thai Airways International, Egypt Air, Cathay Pacific, China Air Lines, Singapore Airlines, and Air Viet Nam.

The Philippines is a member of the International Civil Aviation Organization and is a signatory to the principal international conventions governing civil aviation. Philippines Air Lines is also a member of the International Air Transport Association.

As noted previously, martial law has been in force in the Philippines since September 1972, and all civil aviation resources are under the control of the military. If the military command deemed it necessary they could suspend all or part of the civil air services to enhance military airlift and reconnaissance capability. This type of reinforcement would be costly to the economy and it would be difficult to maintain this force at top efficiency for any period of time. Another disturbing factor about Philippine civil aviation is the flight-safety record. During the period 1965-70, 39 aircraft were involved in accidents. These accidents resulted in the destruction of 17 aircraft and the loss of

190 lives. Both Air Manila and PAL lost major transport aircraft in accidents during 1972. Human error certainly is one of the reasons for this deplorable record, but the inadequacy of the country's air facilities is probably the single most crucial factor. There are only a very limited number of navigational and landing aids, and runways at most fields are not hard surfaced and few have lights.

## J. Airfields<sup>1</sup> (C)

The air facilities system consists of 273 usable airfields, six seaplane stations, and 113 airfield sites. Eight airfields are military, three are joint military/civil, and 262 are civil or private.

The five principal military airfields (U.S. and Philippine) and the largest international airport are located in the area of central Luzon within 60 miles of Manila. The remaining airfields are fairly evenly distributed throughout the country and provide air service to all the larger islands. Because of the predominantly mountainous nature of the terrain inland, most of the airfields are located in the coastal regions. Details of 15 selected airfields are tabulated in Figure 12.

Manila International is the primary airport of entry. The 11,000-foot paved runway is used daily by DC-8 and Boeing 747 aircraft. Clark Air Base is a U.S. military airfield with a 10,500-foot paved runway; it has complete facilities and is capable of sustaining heavy logistic support activity. Mactan International is a joint airfield with an 8,500-foot concrete runway and is capable of supporting heavy transport or light bomber operations. About half the civil or private airfields can accommodate light transport aircraft but have very limited support and service facilities. The remainder of the airfields are suitable for light aircraft operations only. There are 42 airfields with permanent-surfaced runways, ranging from 10,000- to 650,000-pound gross weight load-bearing capacity. The remaining airfields have temporary surfaced runways. The seaplane stations have little activity and meager or no facilities, but are usable in an emergency. The airfield sites are former facilities that have been returned to cultivation or reverted to a natural state.

Airfield maintenance in general is considered poor and most of the airfields do not have adequate support and service facilities. A 10-year vertical expansion, rehabilitation, and development program was

<sup>1</sup>For detailed information on air facilities in the Philippines, see Volume 29, *Airfields and Seaplane Stations of the World*, published by the Defense Mapping Agency, Aerospace Center.

FIGURE 12. Selected airfields (C)

| NAME AND LOCATION   | LONGEST RUNWAY:<br>SURFACE; DIMENSIONS;<br>ELEVATION ABOVE<br>SEA LEVEL | ESWL*         | LARGEST<br>AIRCRAFT<br>NORMALLY<br>SUPPORTED | REMARKS   |
|---|---|---------------|--|---|
|   | <i>Feet</i>   | <i>Pounds</i> |  |   |
| Bacolod.....<br>10°39'N., 122°56'E.; on Negros  | Concrete.....<br>4,920 x 98<br>20                                       | 33,000        | DC-9.....                                    | Civil. Trunkline airport used by BAC-111 aircraft. Aviation and jet fuel in underground storage.                                |
| Baguio.....<br>16°23'N., 120°37'E.; on Luzon  | Asphalt.....<br>5,020 x 100<br>4,200                                    | 28,160        | DC-4.....                                    | Civil. Visited by Philippine and American government, military, and diplomatic leaders. Used by HS-748 aircraft.                |
| Basa Air Base.....<br>14°59'N., 120°29'E.; on Luzon<br>near Floridablanca                 | Asphalt.....<br>8,359 x 150<br>151                                      | 14,200        | C-47.....                                    | Military. Philippine Air Force jet and instrument training base. POL available.   |
| Cagayan de Oro.....<br>8°25'N., 124°37'E.; on Mindanao                                    | Concrete.....<br>6,562 x 118<br>610                                     | 33,000        | DC-9.....                                    | Civil. Trunkline airport used by BAC-111 aircraft. Aviation gas and jet fuel in underground storage.                            |
| Clark Air Base.....<br>15°11'N., 120°33'E.; on Luzon, 2.8<br>miles NW. of Angeles         | Concrete.....<br>10,500 x 150<br>478                                    | 65,100        | C-141.....                                   | Military (joint PAF-USAF). Foreign clearance base. Primary logistic-support facility. Large POL storage capacity.               |
| Cubi Point NAS.....<br>14°48'N., 120°16'E.; on Luzon, 2<br>miles S. of Olongapo           | Concrete.....<br>9,000 x 200<br>55                                      | 56,607        | C-135.....                                   | Military. Foreign clearance base. Supports fleet air operations.  |
| D Z Romualdez.....<br>11°14'N., 125°02'E.; on Leyte, 2<br>miles SE. of Tacloban           | Concrete.....<br>5,150 x 100<br>6                                       | 28,160        | DC-4.....                                    | Civil. Trunkline airport used by HS-748 and Nord 262 aircraft. Aviation and jet fuel available.                                 |
| Davao.....<br>7°08'N., 125°39'E.; on Mindanao   | Concrete.....<br>5,248 x 120<br>88                                      | 33,000        | DC-9.....                                    | Civil. Used by BAC-111 aircraft. Aviation gas and jet fuel available.   |
| Fernando Air Base.....<br>13°57'N., 121°07'E.; on Luzon, 2.5<br>miles WNW. of Lipa        | Concrete.....<br>4,300 x 98<br>1,220                                    | 14,200        | C-47.....                                    | Military. Philippine Air Force flight training base. Aviation fuel available.   |
| Iloilo.....<br>10°43'N., 122°33'E.; on Panay  | Concrete.....<br>4,920 x 100<br>23                                      | 33,000        | DC-9.....                                    | Civil. Trunkline airfield used by BAC-111 aircraft. Some aviation and jet fuel available.                                       |
| Laoag.....<br>18°11'N., 120°32'E.; on Luzon   | Asphalt.....<br>4,790 x 98<br>13  | 28,236        | DC-4.....                                    | Civil. Alternate for Manila as international airport of entry. Aviation gas and jet fuel.                                       |
| Mactan International.....<br>10°19'N., 123°59'E.; on Mactan<br>Island, 5 miles E. of Cebu | Concrete.....<br>8,500 x 153<br>33                                      | 65,100        | C-141.....                                   | Joint. International airport. Alternate for Manila. Aviation and jet fuel available.  |
| Manila International.....<br>14°31'N., 121°01'E.; on Luzon                                | Concrete.....<br>11,000 x 200<br>74                                     | 56,607        | C-135.....                                   | Joint. Principal civil foreign clearance base. Headquarters, Philippine Air Force. Aircraft includes 747's on regular schedule. |
| Sangley Point Air Base.....<br>14°30'N., 120°54'E.; on Luzon, 10<br>miles SSW. of Manila  | Concrete.....<br>8,000 x 150<br>5                                       | 56,607        | .....do.....                                 | Military. Philippine Navy controls this former U.S. Navy all-weather air station. Emergency civil use only.                     |
| Zamboanga.....<br>6°55'N., 122°04'E.; on Mindanao   | Concrete.....<br>5,906 x 118<br>32                                      | 65,100        | C-9.....                                     | Joint. Alternate for Mactan as international airport of entry. Aviation gas and jet fuel in aboveground tanks.                  |

\*Equivalent Single-Wheel Loading: Capacity of an airfield runway to sustain the weight of any multiple-wheel landing gear aircraft in terms of the single-wheel equivalent.

initiated for Manila International Airport after a destructive fire in January 1972 that caused considerable damage to the international terminal, including the tower and most electrical communication circuits. A nationwide program for installation of navigation aids is expected to be completed by 1976. A program for improvement of secondary airports is almost completed, with the exception of some support building and possibly some fuel storage facilities.

Potential for expansion at Cubi Point Naval Air Station and Sangley Point Air Base is limited. Clark Air Base and Mactan International have excellent potential for physical expansion and sustained support operations. Manila International is under consideration as the site for expansion to accommodate supersonic transport activity.

### K. Telecommunications (C)

Development of telecommunication (telecom) facilities has been insufficient to satisfy economic or military requirements. Despite substantial improvement in interisland and international communications, the rate of progress is below that of nearby Asian countries. Additional radiocommunication stations, submarine cable, high-capacity radio-relay networks, and a satellite ground station have increased international services but have had minor impact on domestic quality. The system is lacking in density and variety, and distribution of reliable facilities is highly uneven.

Telecom facilities are controlled either through direct ownership or the licensing of private companies by the Bureau of Telecommunications of the Department of Public Works and Communications. Telegraph and telephone services are provided under government franchise by about 90 private concerns, of which the Philippines Long Distance Telephone Company is the largest. This company and the Bureau of Telecommunications account for the majority of the domestic services. International communications are provided mainly by other commercial firms. Radio and television broadcast stations are government controlled but privately operated.

The insular composition, geographic location, and topography of the country present considerable problems in maintenance and operation. Frequent typhoons and serious flooding often result in damage to both landlines and radio facilities serving the widely scattered islands. Absence of secondary connections results in the service being particularly susceptible to disruption. In addition, the hot and humid climate necessitates tropicalization of electronic equipment.

Domestic telecommunications consist predominantly of radio-relay and high-frequency radio links. Development is more extensive on Luzon and Mindanao, geographically covering a large portion of each, although density is very low. Other main islands also have one or more main points of interisland contact. Manila is the hub of the domestic network and most communication media link the capital to other major cities. Landlines are used principally for telephone and telegraph within and in the immediate vicinity of principal urban areas. AM radio and television also provide extensive coverage, reaching a large proportion of the population.

The telephone system is almost completely automatic. Over 350,000 telephones are in use, predominantly serving the Manila area. The relative importance of expanding telephone service in the vicinity of the capital is indicated by recent construction of eight new automatic exchanges. Over three-fourths of the telephones are owned and operated by the main firm, the Philippines Long Distance Telephone Co. Although the telephone density in the vicinity of Manila is high, there are only nine instruments per 1,000 population countrywide. The national density has almost doubled since 1967, but the country still ranks far below most of its Asian neighbors, including Hong Kong, Taiwan, Malaysia, Okinawa, and South Korea.

Radio and television broadcast facilities are highly competitive. Transmissions from more than a hundred, primary AM radio stations cover the medium-frequency broadcast spectrum. A considerable number of main AM broadcast stations are served by a large number of relay or rebroadcast facilities. These are widely dispersed and provide excellent coverage of the archipelago, reaching about 90% of the population. Eight FM stations serve Manila only. In early 1972, 16 television stations, located mostly in the main urban areas, provided adequate TV coverage of the most populous cities, assisted by TV relay or rebroadcast facilities. There are nearly 6 million radiobroadcast receivers and about 500,000 television receivers; almost half of the TV receivers, however, are located in the Manila area.

Special-purpose systems are operated by the government for law enforcement agencies, the national railroads, and the military. The army uses radio-relay facilities and the navy and air force operate high-frequency radio systems. Because common-carrier systems lack sufficient coverage and reliability, many commercial enterprises depend primarily on privately operated, high-frequency radio facilities. However, current U.S. aid projects,

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particularly those designed to ensure communications during disaster or civil insurrection, will increase communications effectiveness.

Manila, the international telecom center, is served by a variety of modern facilities. Installations include a dual-capacity communications satellite ground station at nearby Tanay in Rizal Province. The facility provides 66 radio circuits eastward, direct to seven countries via the Pacific Ocean satellite. It also has 10 circuits westward, direct to another seven nations via the Indian Ocean satellite. Use of satellites will gradually supplant high-frequency radio which has been the mainstay for international radiocommunications, providing connections with most world centers. A troposcatter link also connects to Taiwan. Three single-channel telegraph submarine cables connect Manila to Hong Kong, and the 128-channel Transpacific submarine cable links Baler Bay to Guam and the United States. The South Asia Far East Cable system now being planned will connect to Taiwan and Thailand. The U.S.-owned and -operated 60-channel military submarine cable connects the cable terminal at Olongapoo to Nha Trang (South Vietnam), and thence to Saigon via a troposcatter link.

The indiscriminate granting of franchises has hampered development since it has not permitted the building of a flexible, integrated, and capable network. The privately operated communications are concentrated in the large cities while the government, by default, is responsible for services in the provinces. Franchise areas frequently overlap, resulting in duplication of basic routes. Establishment of parallel basic routes forces competitive firms to resort to narrow-band, cheap construction which causes system instability.

A comprehensive Four Year Plan (FY72-75) provides for greater development of the existing basic radio-relay network system. Plans call for expansion of VHF/UHF, microwave, and troposcatter radio-relay links, radiocommunication service, and submarine

cables. All the more important major islands and many of the provinces already have been provided with at least an initial installation of telephone and telegraph facilities. Continuing augmentation will insure a wider distribution of services into adjacent rural areas and barrios. Palawan is the next large island to be incorporated into the countrywide basic long-distance network. A plan for domestic satellite distribution of television also is under consideration, and 26 earth stations may be required.

Training in telecommunications is afforded by five universities offering engineering studies, and 38 schools having vocational courses. The Bureau of Telecommunications also maintains a training institute at Valenzuela, near Manila, under the auspices of the International Telecommunications Union and the United Nations Development Program.

Japan has contributed significantly to telecom development. Participation has included necessary assistance in the establishment of both government-operated and privately operated facilities. Japan also has undertaken technical training of personnel, and a number of technicians and engineers have been schooled in Japan. Technical training has also been provided by Australia. Frequently, telecom personnel with foreign educations occupy important positions in the domestic operations.

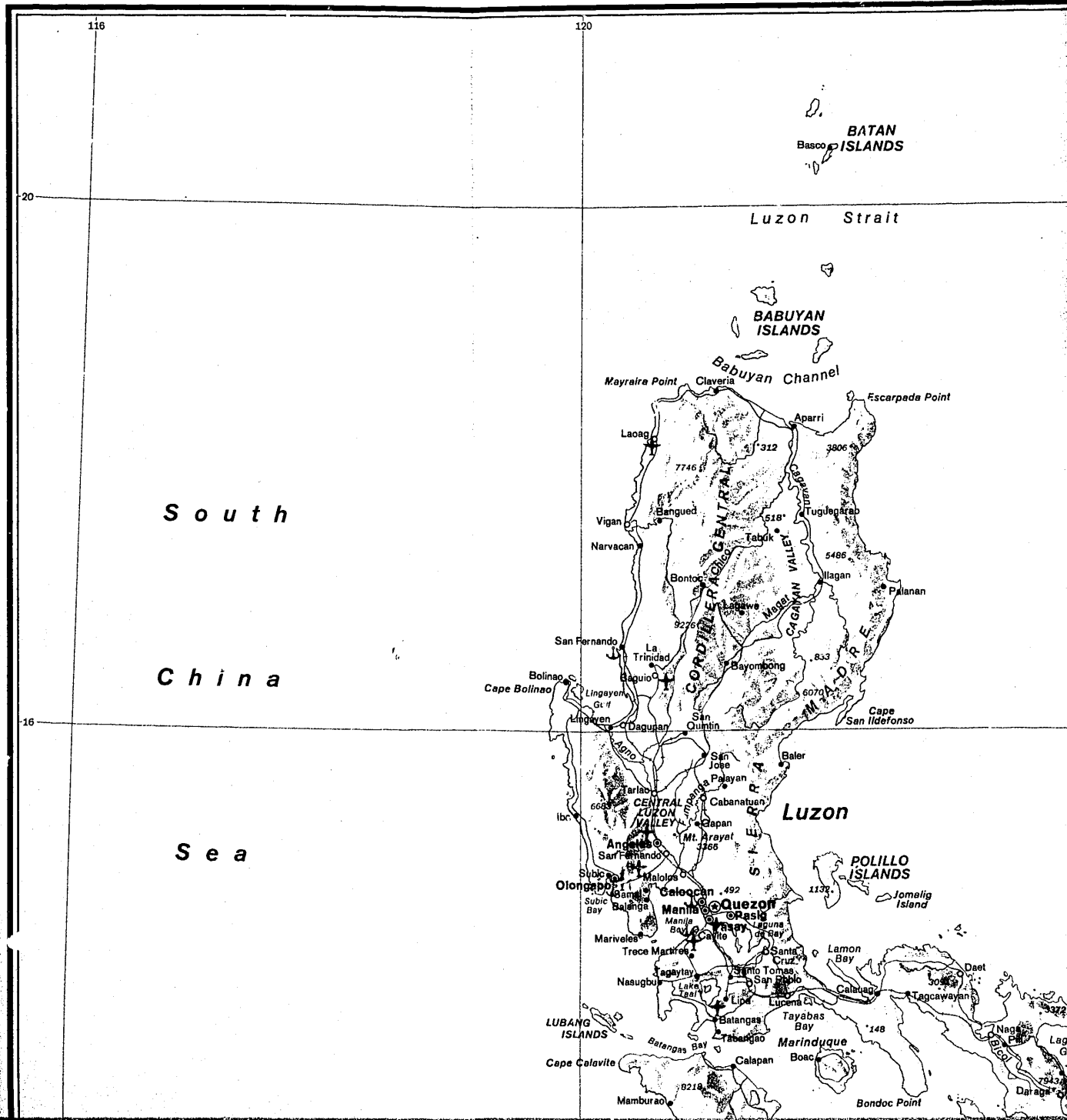
Imported equipment is necessary to satisfy most telecom needs. Principal sources of civil telecom equipment and materials are Canada, Japan, and the United States. The United States also furnishes the bulk of the military telecom hardware. A modest-sized domestic industry produces many components and assembles some end products such as radio and TV receivers and telephone and telegraph sets. Government efforts to increase the industry's output have not been successful. The value of output has increased at a lower rate in the Philippines than similar production in other Asian developing nations.

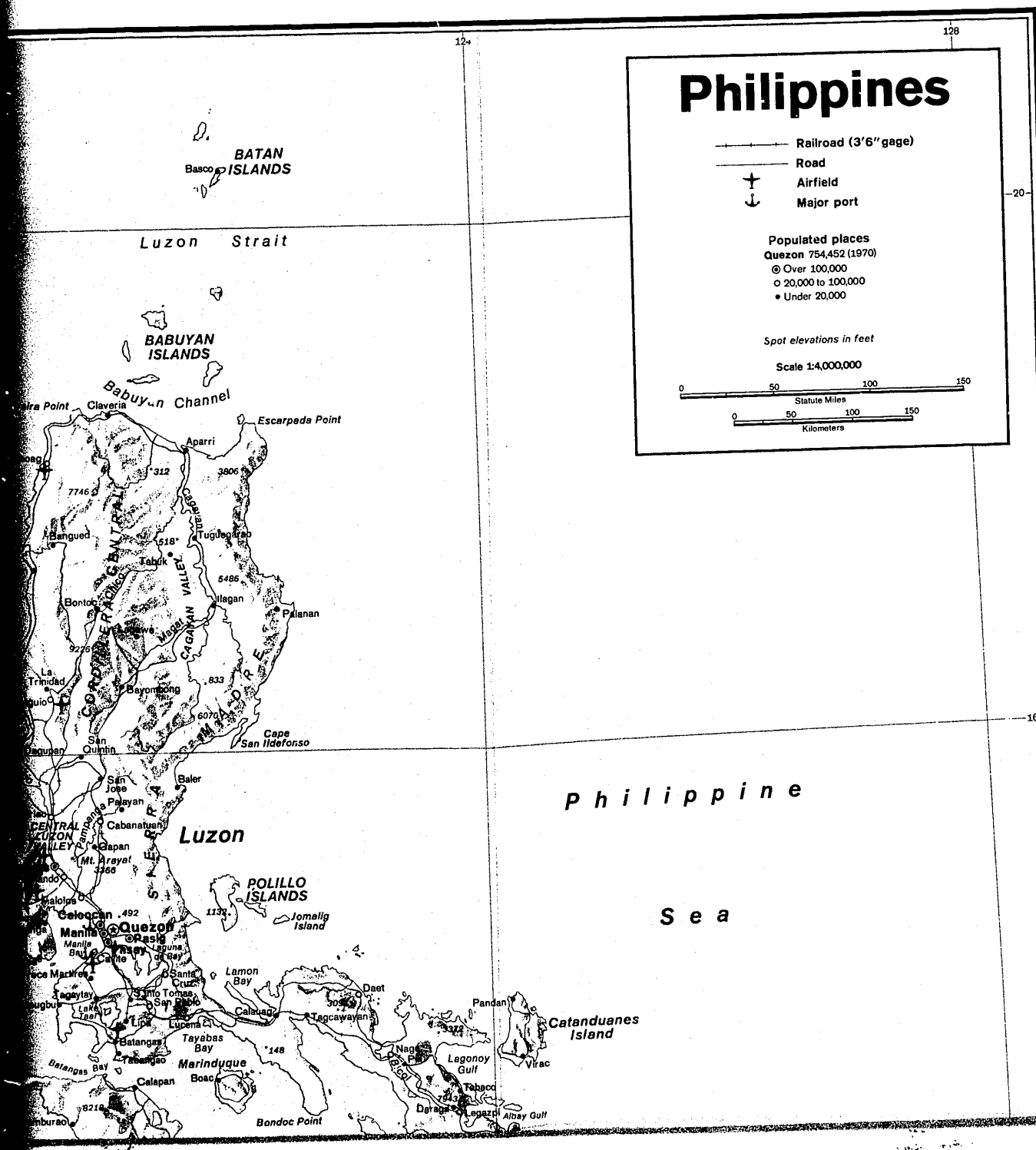
## Glossary (u/ou)

| ABBREVIATION   | ENGLISH   |
|----------------|---|
| AMI.....       | Air Manila, Inc.                                      |
| ADB.....       | Asian Development Bank                                |
| FOA.....       | Filipinas Orient Airways, Inc.                        |
| IBRD.....      | International Bank for Reconstruction and Development |
| MRR.....       | Manila Railroad Company                               |
| NDC.....       | National Development Company                          |
| PAL.....       | Philippine Air Lines, Inc.                            |
| PNR.....       | Philippine National Railways                          |
| Philrayco..... | Philippine Railway Company                            |

Places and features referred to in this General Survey (u/ou)

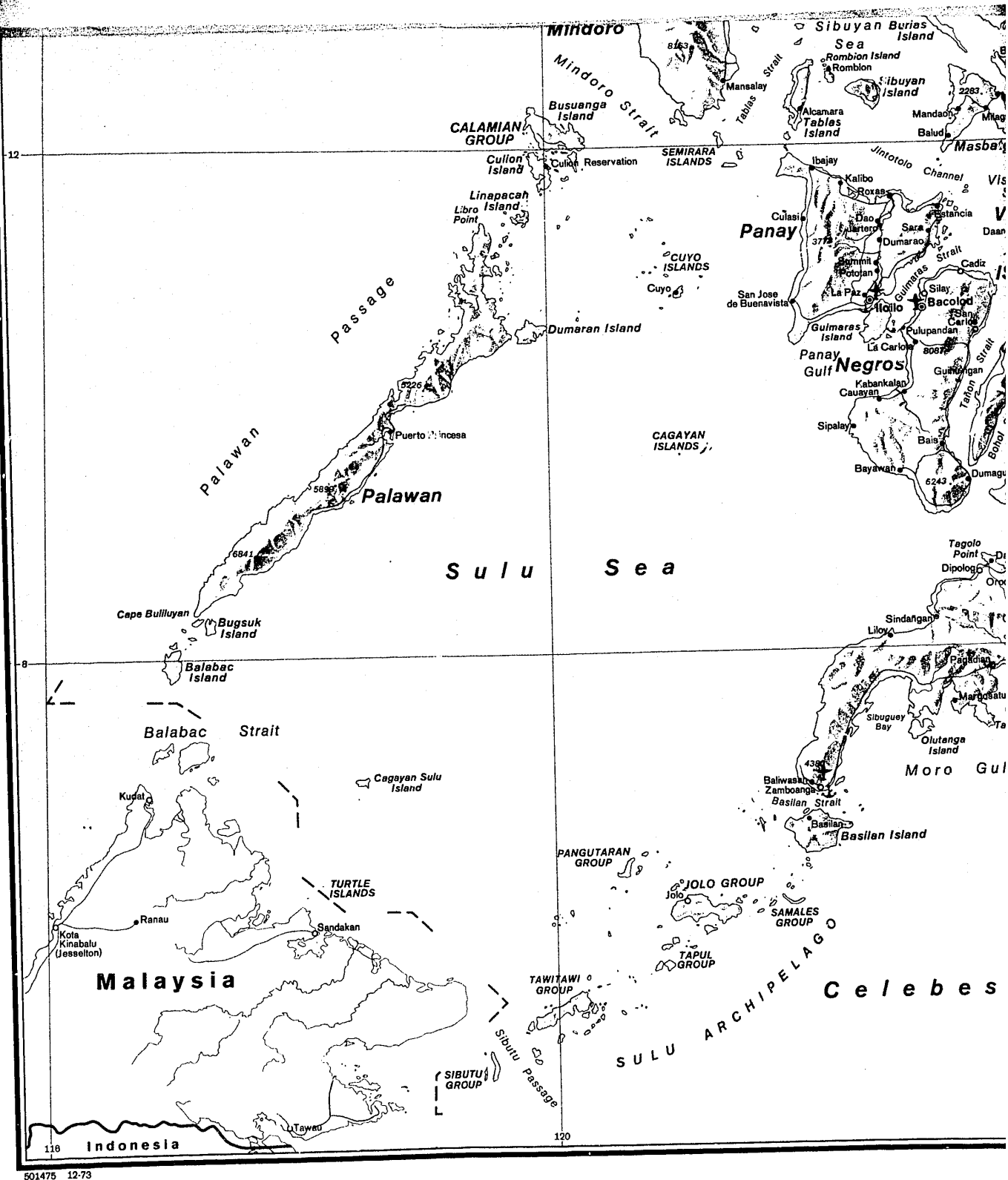
|                                     | COORDINATES |        |  | COORDINATES |        |
|-------------------------------------|-------------|--------|--|-------------|--------|
|                                     | ° 'N.       | ° 'E.  |  | ° 'N.       | ° 'E.  |
| Agno ( <i>strm</i> ).....           | 16 02       | 120 08 | Luzon ( <i>isl</i> ).....                  | 16 00       | 121 00 |
| Agus ( <i>strm</i> ).....           | 8 11        | 124 12 | Mactan Island ( <i>isl</i> ).....          | 10 18       | 123 58 |
| Agusan ( <i>strm</i> ).....         | 9 00        | 125 31 | Makati.....                                | 14 34       | 121 02 |
| Agusan del Sur ( <i>prov</i> )..... | 8 30        | 125 50 | Malolos.....                               | 14 51       | 120 49 |
| Albay Gulf ( <i>gulf</i> ).....     | 13 10       | 124 00 | Mandaluyong.....                           | 14 38       | 121 03 |
| Ampayon.....                        | 8 58        | 115 36 | Manila.....                                | 14 35       | 121 00 |
| Angat ( <i>strm</i> ).....          | 14 53       | 120 46 | Manila Bay ( <i>bay</i> ).....             | 14 30       | 120 45 |
| Angeles.....                        | 15 09       | 120 35 | Marawi.....                                | 8 01        | 124 18 |
| Antipolo.....                       | 14 35       | 121 10 | Maria Cristina Falls ( <i>falls</i> )..... | 8 11        | 124 12 |
| Antique ( <i>prov</i> ).....        | 11 10       | 122 05 | Mariveles.....                             | 14 26       | 120 29 |
| Arayat, Mount ( <i>mtn</i> ).....   | 15 12       | 120 45 | Masbate ( <i>isl</i> ).....                | 12 15       | 123 30 |
| Bacolod.....                        | 10 40       | 122 57 | Mayon Volcano ( <i>mt</i> ).....           | 13 15       | 123 41 |
| Bagacay.....                        | 11 49       | 125 14 | Mindanao ( <i>strm</i> ).....              | 7 07        | 124 24 |
| Baguio.....                         | 16 25       | 120 36 | Mindanao ( <i>isl</i> ).....               | 8 00        | 125 00 |
| Balabac Island ( <i>isl</i> ).....  | 7 57        | 117 01 | Mindoro ( <i>isl</i> ).....                | 12 50       | 121 05 |
| Balayan Bay ( <i>bay</i> ).....     | 13 51       | 120 47 | Mindoro Occidental ( <i>prov</i> ).....    | 13 00       | 120 55 |
| Baler.....                          | 15 46       | 121 34 | Mountain ( <i>prov</i> ).....              | 17 05       | 121 10 |
| Baler Bay ( <i>bay</i> ).....       | 15 50       | 121 35 | Muntinglupa.....                           | 14 23       | 121 03 |
| Baliwasan.....                      | 6 55        | 122 03 | Naga.....                                  | 13 37       | 123 11 |
| Basilan.....                        | 6 42        | 121 58 | Nasugbu.....                               | 14 05       | 120 38 |
| Basilan Island ( <i>isl</i> ).....  | 6 34        | 122 03 | Navotas ( <i>port</i> ).....               | 14 39       | 120 57 |
| Basilan Strait ( <i>str</i> ).....  | 6 49        | 122 05 | Negros ( <i>isl</i> ).....                 | 10 00       | 123 00 |
| Bataan ( <i>prov</i> ).....         | 14 40       | 120 25 | Negros Occidental ( <i>prov</i> ).....     | 10 25       | 123 00 |
| Batangas.....                       | 13 45       | 121 03 | Nueva Ecija ( <i>prov</i> ).....           | 15 35       | 121 00 |
| Batangas Bay ( <i>bay</i> ).....    | 13 43       | 121 00 | Olongapo.....                              | 14 50       | 120 16 |
| Bauan.....                          | 13 48       | 121 01 | Pacta.....                                 | 14 23       | 121 29 |
| Bauang.....                         | 16 31       | 120 20 | Pakiputan Strait ( <i>str</i> ).....       | 7 07        | 125 40 |
| Benquet ( <i>prov</i> ).....        | 16 30       | 120 40 | Palawan ( <i>isl</i> ).....                | 9 30        | 118 30 |
| Bicol ( <i>strm</i> ).....          | 13 44       | 123 07 | Palawan ( <i>prov</i> ).....               | 10 00       | 118 45 |





### Selected airfields





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